



*The*

# *Blurb*



*Newsletter of The Phil-Mont Mobile Radio Club*  
*Public Service Since 1949*

Volume 56 Number 8

<http://www.phil-mont.org>

August 2006

*Hey, gang! Let's make August...*

## *Transistor Appreciation Month*

*...would you want this digital clock on your night table?*



See: <http://www.jogis-roehrenbude.de/Leserbriefe/Brueggmann-Digital-Roehren-Clock/Digital-Roehrenuhr.htm>

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powered by



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**Labels and mailing:** WB3KOJ & WB3KOH

**Submissions deadline:** all copy must be in the hands of the Editors by the 20th of the previous month.

### ***Sunday Morning Net Schedules***

- **2 Meter/ 70cm Net**.....at 09:30et on W3QV repeater
- **10-on-10 Net** .....at 10:00et 28.393 MHz USB (±QRM)
- **75 meter Net** .....at 10:20et 3.993 MHz LSB

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**For club information:** contact any club officer, or the repeaters listed below. Address or club directory changes, and articles that are for the membership e-mail list should be sent to: [wb3koj@comcast.net](mailto:wb3koj@comcast.net)

**The club meets** at 7:30 PM on the **second non-holiday Wednesday** of every month except July and August at

**The Masonic Village at Lafayette Hill**

**801 Ridge Pike**

**Lafayette Hill, PA 19444-1799**

**All visitors are welcome!**

### ***License Examinations***

are held on the **first non-holiday Thursday** each month (except July and August) at

**Northeast High School,**

**Cottman and Algon Streets, Philadelphia PA**

Registration begins at 6:00 P.M. Enter through the SPARC wing. Exams begin and doors closed and locked at **6:30 P.M. Sharp!** Applicants should call Dusty ND3Q at 215-879-0505

### ***Club Stations***

**W3QV Club Repeater - Trustee: W3BBB**

Ridge & Port Royal Avenues, Philadelphia, PA

**147.03 MHz + PL 91.5 Hz ⇄ 444.80 MHz + PL 186.2 Hz**

Reach us on Echolink through WU3I-L

**W3AA -Trustee: WU3I**

**W3EM - Field Day/special event station Trustee: W3VVS**

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### ***Committees***

Archives: NG3P

Audit: NS3K

Awards: open

Blurb folding:

WB3KOJ & WB3KOH

Directory:WB3KOJ

DX: N3MT

Emerg.Coar.: K3HME

Field Day: KE3QB

Internet: K3XS

Membership: N3XKE

Net Control: KB3IV

Publicity: W3RM

Program: Club VP

Public Service: KE3QB

Refreshments: W3AOK

Repeater: W3BBB

Skywarn: WX3PHI

Sunshine: N3GLU

Youth: N3MT

TVI: W3WS

VE Program: ND3Q

W3AA Trustee: WU3I

Welcome: K3CJ.

## CW: An Old Mode Reborn

--de Barry Feierman K3EUI

One of the simplest means of communicating by radio is to turn your carrier RF wave on/off by a keying circuit of some type. There are three states: off (no RF), on for a short time (dit), and on for a longer time (dah). Put the dits and dahs together into a kind of alphabet (Morse) and you have a means of communicating by radio. Thus, the mode we call **CW** was born. CW is simple technically, takes up very limited "bandwidth" (the RF spectrum needed to communicate by this mode), and is easy to demodulate (recover the sound) at the receiver. CW is also a simple mode because the transmitter needs no audio circuitry.

My first CW rig was a simple four tube homebrew using a crystal oscillator (6AU6), a rectifier and voltage regulator, and a final RF amplifier (6146). I built this transmitter with mostly junk TV parts. It put out about 50 watts and I could work 80, 40, or 15 meters (the Novice bands back then) with a few crystals. The year was 1958, the sunspot cycle was at its peak, and I could work the world with a dipole antenna. What a wonderful introduction to the hobby for me as a new "novice" KN3EUI.

CW always fascinated me, both as a youngster and now, as an adult 47 years later. But the technology has come a long way since those simple crystal transmitters. I began to

We're fortunate in this month of summer doldrums to feature a terrific article from our own Barry K3EUI. Next month we're hoping to have photos from Field Day 2006.

-- de Maggie K3XS

*On our cover--*

**Friedhelm Bruegmann**, a member of the German Tube Collectors Association, took seven years to build a 103-tube digital clock. Read all about it at the website listed under the picture.

*(In German.)*

wonder how I might incorporate some of the new technology of computers and sound cards to enjoy the CW mode from a different perspective.

### Enter: Sound Cards

One of the new technologies available to ham radio operators is the computer and sound card. Sounds (audio frequencies) created by the sound card can be used to "modulate" the radio wave in a SSB transmitter to create the various digital modes now known as RTTY, PSK31, SSTV, and of course, CW.

### How it works: Receiving Digital Mode

All you need to receive the digital HF modes is a shielded cable to connect between your speaker jack (use a Y splitter) and the **INPUT** to

the sound card. You may need to adjust the volume of the audio from your radio, as well as the input sensitivity of your sound card to prevent getting too much audio into your sound card. Double click the speaker icon on the bottom of your Windows screen and up comes a sound control panel. Your **RECORDING** panel should have a number of input choices. Select the proper input (LINE or MIC) and adjust the input sensitivity to get just enough signal into the sound card. You need no "interface" to receive and decode digital signals.

### Software:

There are plenty of choices of free or shareware software these days. My preferences are the following: RTTY (MMTTY) PSK31 (Digipan, Win PSKse), Slow Scan TV (MMSSTV), and CW (CW GET and CW Type).

Some programs can do multimodes (MixW, Hamscope, Stream). You can purchase a CD with these and more programs for \$10 from West Mountain Radio at [www.westmountainradio.com](http://www.westmountainradio.com)

### Transmitting Digital Modes

To transmit the digital modes, you have to accomplish two tasks: turn your transmitter on, and feed the proper level of audio into the microphone circuit of your SSB radio. Turning your transmitter on can be accomplished by your software and involves a circuit called “push-to-talk” (PTT). Most software sends a control signal over one of the serial port lines (DTR or RTS) to key the transmitter, just like pushing the talk switch on your microphone. However, you don’t want your microphone to be “live” while operating on the digital modes with a sound card, so you need to either unplug your mic, or have the hardware do it for you by disconnecting the microphone line from the transmitter.

### Interface hardware

There are devices manufactured today which take care of all the problems typically found in getting on the digital modes. I use a device called a Rigblaster Plus manufactured by West Mountain Radio, but there are others on the market. The **output** of my sound card (LINE out or HEADPHONE out) connects via a three-conductor stereo shielded cable to my Rigblaster. The Rigblaster conditions the wave, isolates the ground, and adjusts the volume. On most Rigblasters, you can also plug

in your microphone to the Rigblaster box. When you push the PTT switch on your mic, the Rigblaster disconnects your sound card. What a nice feature. A major problem to avoid is RF feedback, getting unwanted sounds from your sound card back into your mic line and rig.

I have used this combination of sound card, Rigblaster and radio to make numerous contacts on the digital modes. RTTY is one of the oldest digital modes, and you can still find a lot of activity around 14.080 -14.090 MHz. RTTY is accomplished by alternating one of two tones called a “mark” and a “space” which differ by 170 Hz. These tones are alternated in a specific pattern, called a Baudot or Murray code, with typical speeds of 60 wpm.

PSK31 came along a few years ago as a result of the hard work of Peter Martinez (G3PLX). PSK31 has the advantage of taking up very little bandwidth (about 30 Hz) and works well under weak signal conditions. You can work PSK31 on twenty meters (14.070-14.073) and work the world with 10 watts and a simple dipole or vertical antenna.

### CW using a sound card and keyboard

Then I wondered about operating on CW mode with my new digital setup. One of the Rigblasters, the PLUS model, allows you to key the transmitter while operating in CW mode just like keying your rig with a straight key or electronic keyer.

One of the serial lines (RTS or DTR) is typically “keyed” by the software, and a shielded cable connecting the CW out jack of the Rigblaster connects to the CW KEY line of the radio. Simply, the software “keys” my transmitter and I can send CW by typing on my keyboard. An advantage of typing on my keyboard is that I can type faster than I can send with a real key, I don’t get tired, I can create macros, and I can correct typing mistakes as I go, before the transmitter actually sends the CW signal. And, of course, the radio sends perfectly spaced Morse.

But I also wondered about operating CW using an entirely different technique. What if I keyed an **audio tone** going from my sound card into the mic jack of my transmitter while the rig was in SSB mode (not CW mode)? What kind of signal would I produce?

I set the audio frequency of the sound card in the software **CW Type** to 800 Hz, operated with my rig on USB, and sent the audio through my Rigblaster interface to the mic jack of my transmitter. I adjusted the audio level carefully so as to not overdrive my SSB radio into ALC action. It worked! But it bothered me that I was sending CW with my rig in SSB mode (either USB or LSB worked the same). Why was I bothered?

**Well... was I sending out an SSB signal in the CW part of the 20 meter band?**

**Is it legal to send CW with a keyed audio tone in SSB mode?**

I wrote to a number of ham friends of mine and asked if they thought it was "legal" to send CW by keying the audio line (sine wave) of an SSB transmitter. Wow.... did that ever generate a lot of heated discussion. I then contacted West Mountain Radio (makers of my Rigblaster) and asked them if it was legal to send CW by keying the audio line in SSB mode. I knew it worked, but I didn't know if I was legal doing it this way. The West Mountain Radio guy would not answer me either way... hedging his bet.

Then I wrote to Steve Ford, editor of QST and author of the ARRL HF Digital Handbook. Steve said he would check with the "lab guys" at ARRL on the legality of sending CW by keying the audio line of an SSB radio. Steve Ford was not 100% sure a few weeks ago that sending CW by keying an audio line going into the mic jack of an SSB radio was legal. Steve contacted ARRL employees Chuck Skolaut (FCC Regulatory expert), and then

Ron Henderson, and finally Larry Wolfgang (Technical Correspondence Editor at ARRL Headquarters). I think I opened a "can of worms" by asking this question.

### What is CW?

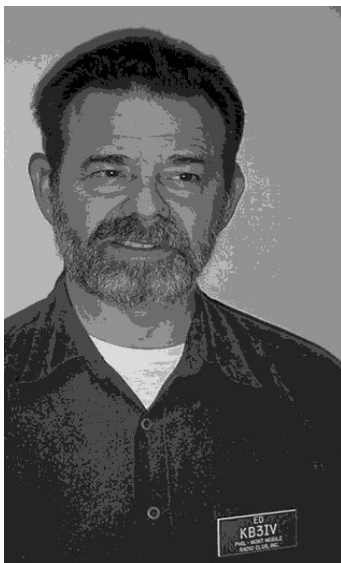
CW is really a form of "double sideband modulation". When you close/open a key line in any RF circuit, you generate many frequencies (harmonics) and that these various frequencies "amplitude modulate the carrier" to create sidebands. CW signals are not an infinitely thin slice of RF spectrum, since if they were, they'd contain no energy at all.

Typical CW signals are a few hundred hertz wide even from a well designed transmitter. The bandwidth of a CW signal is related to the keying "waveshape" of the RF envelope and the keying "speed" in wpm. Faster rise time and faster keying speeds result in a wider bandwidth. This is all

discussed in the latest ARRL handbook, but I think many of us don't really understand how or why an on/off RF signal has any bandwidth at all. I did remember that my early CW tube rig of the 1950's had bad "key clicks" (high frequency harmonics). Now I know what that means.

OK... so that is CW, although it is NOT a "continuous wave" since it is keyed on/off.

So maybe we should call it a **keyed-continuous-wave** (KCW) or on/off continuous wave (OOCW). This is the traditional A1A designator for CW operation. That's how we all made a CW signal in the old days. The receiving end needs to translate this on/off RF signal into an audio tone so that the listener can hear the Morse dit-dahs. Such is the function of the BFO (beat frequency oscillator and mixer) and detector (capture the audio) and speaker in the receiver. You can't "hear" the audio tones of a CW signal with your receiver in the AM or FM



## The Prez Sez

--de Ed KB3IV, PMRC President

### 2m/70cm/Echolink Net Control Schedule

|             |          |           |          |           |         |
|-------------|----------|-----------|----------|-----------|---------|
| <b>Aug</b>  | 6-N3FH   | 13-N3OWM  | 20-KB3IV | 27-K3XS   |         |
| <b>Sept</b> | 3-N3QV   | 10-WB3KOJ | 17-KB3IV | 24-WU3I   |         |
| <b>Oct</b>  | 1-N3FH   | 8-N3OWM   | 15-KB3IV | 22-K3XS   | 29-N3QV |
| <b>Nov</b>  | 5-WB3KOJ | 12-WU3I   | 19-KB3IV | 26-N3FH   |         |
| <b>Dec</b>  | 3-N3OWM  | 10-K3XS   | 17-KB3IV | 24-WB3KOJ | 31-N3QV |



position (bfo off). Well... it just goes "thump, thump, thump" and is not pleasant to copy.

Then I remembered my sound card. Can CW also be generated in your transmitter if your computer sound card sends a **keyed audio frequency** into the microphone jack of your SSB transmitter? Note that now your rig is in USB or LSB mode, not CW.

### CW or MCW?

Many, perhaps most of the hams I contacted said "no... sending CW by keying an audio line of an SSB radio is NOT legal since it is sending **MCW** (modulated CW) not CW. MCW is not legal on the HF bands. What is MCW and how is it made in a radio?

Well, one definition of MCW is that the receiver does not need a BFO to hear the note.

I sent MCW when I attached a tone oscillator to my mic line and transmitted code practice on 2 meters AM or FM (along with a carrier). Also, MCW is what repeaters transmit to identify in Morse on FM, and airplanes send MCW on the AM aircraft 125 MHz band. In all of these cases, there is a carrier and the keyed audio tone modulates the carrier (AM or FM). You don't need a bfo in your two meter rig to hear the Morse ID's from repeaters. If you DO need a bfo in your receiver to hear the Morse sounds, then your transmitter is sending CW, not MCW. So what does happen when you key the audio line going into your microphone jack

with the rig in SSB mode? Let's take a careful look at this process.

### What is Modulation?

First let's ask what happens if you feed a constant amplitude audio sine wave of high purity into the mic jack of an SSB radio and do not overdrive the rig's ALC into action? Is this "modulation"? (good question.... so what is modulation?)

A single pure sine wave of audio fed into an SSB transmitter results in a double sideband amplitude modulated wave in some mixer stage. But before the radio wave exits the transmitter, the carrier is removed (by a balanced modulator stage) and one of the sidebands is removed (by a filter). What exits the radio is an RF wave of constant amplitude and frequency on whatever band your radio is set to. There is no modulation even though you are using the mic line in SSB mode. There is no modulation because there is no **CHANGE** in the amplitude, frequency, or phase of the RF signal getting out of your radio. There is no information being sent. This is just like a "dead" carrier (constant amplitude RF wave) sent by my rig in CW mode with the key down, except for the fact that now my radio is in SSB position, not the CW position. It behaves for all practical purposes just like a "new carrier"? My transmitter is acting just like an "up-converter" switching my (constant) audio frequency to a (constant) radio frequency. There is no

modulation!

### Keying the audio line of an SSB radio

Now, what happens when you KEY the audio wave going into the mic jack of your SSB rig?

The output of the radio is now a keyed RF wave of constant amplitude and frequency in whatever band you are set for. The frequency of the RF wave is a combination of my dial frequency (removed carrier in SSB mode) plus or minus the audio frequency (depending on whether my rig is set for USB or LSB). Let's say that my dial reads 7.100 MHz on my radio and my audio sound card is set for 1000 Hz (1 kHz). If I am in USB, just add the two frequencies to get 7.101 Mhz to get the RF frequency going to the antenna. If I am in LSB mode, then subtract the audio frequency from the (removed) carrier frequency to get 7.099 MHz. An RF frequency meter attached to my coax line shows me this is true.

### Voice Modulation of an SSB signal

The only difference in SSB between keying a single pitch audio sine wave and actually speaking over a microphone is that my voice consists of a wide band of frequencies (200 - 2500 Hz) and all of these frequencies of various amplitudes get converted to an RF SSB signal. This IS modulation.... there is information in the sidebands (my voice).

### Why operate CW in the SSB mode?

My computer software (like CW

**Type)** allows me to type on my keyboard, and the sound card creates the sound (of whatever audio frequency I select) that enters my rig via the mic jack.

What is this mode called? I guess you'd want to call it a modulated SSB signal but that isn't true. There is no classical modulation if I am only keying/unkeying a single pure sine audio wave. There is just energy or no energy at some radio frequency. The signal behaves like a classic CW signal, yet my rig is in the SSB position.

All along, I am assuming that my SSB rig is clean, the carrier and the unwanted sideband are suppressed by >40 dB and the audio tone from my sound card has low harmonics. So my RF signal is clean. This RF on/off signal is for all practical purposes identical in all respects to a keyed RF signal generated by my rig when it is in CW mode.

MCW is not produced by a keyed audio tone entering a properly working SSB radio.

So this is a legal method of generating a CW signal. In fact, the bandwidths of the two methods ought to be similar.

So now I have TWO means to send CW using my computer and rig. I've gotten many CW contacts on 20 meters and have asked the other ops to listen as I switched the method of sending CW: from keying the CW jack (rig in CW mode) to keying the audio coming from my sound card (rig in USB mode). Result - no one could detect any



### Membership Stats

At press time PMRC has:  
 93 full paid members  
 8 family members  
 1 youth member  
 1 honorary members  
 0 pending members

difference.

Keying an audio line going into a properly working SSB radio mimics true CW... in fact it is true CW. It's just that my radio switch is in the SSB mode while I am making CW contacts.

**CW GET** is the receiving program I use. It translates well-sent Morse into letters on my screen and can copy from very slow speeds to speeds greater than 30 wpm.

**CW Type** is the transmitting program I use. You can set the audio frequency and level leaving your sound card with your mouse. You can also adjust the rise/decay time of your audio wave, the dot/dash spacing, and the space between letters in menu settings.

### August Birthdays

02 Tom Bohlander - WA3KLR  
 04 George King - W3PXY  
 05 Rollie Madara - W3PWG  
 09 Carolyn Popovic - KA3VLJ  
 14 Lucille Gargano (XYL N3YGY)  
 Patricia MacKenzie (XYL W3RED)  
 Pat Mescanti (XYL K2LK)  
 15 Art Lester - W3WFI  
 17 Kitty Newman (XYL KC2FIO)  
 18 Norma Coupe (XYL WA3BXH)  
 19 Donna Lynn Larkin - WA1WYQ (XYL KA2FFP)  
 24 Frank Burstein (OM KB3ANO)  
 30 Paul Bohlander - W3VVS  
 Vincent Bueno - WA3ADI

It's very versatile.

I've always enjoyed CW the "old fashioned way" and still copy CW in my head and send with a straight key, but now there is another way I can enjoy the mode. For beginners, CW via computer sound card can be like training wheels, allowing you to copy along in your head as well as see the characters appear on your screen.

Happy CW to everyone. Long Live CW.

Barry Feierman k3eui  
[k3eui@aol.com](mailto:k3eui@aol.com)



## August 2006 with PMRC

Tue 1  
 Wed 2 (no board meeting in August)  
 Thu 3 (no VE exams in August)  
 Fri 4  
 Sat 5  
 Sun 6 NCS-N3FH  
 Mon 7  
 Tue 8  
 Wed 9 (no general meeting in August)  
 Thu 10  
 Fri 11  
 Sat 12  
 Sun 13 NCS-N3OWM  
 Mon 14  
 Tue 15  
 Wed 16  
 Thu 17  
 Fri 18  
 Sat 19  
 Sun 20 NCS-KB3IV  
 Mon 21  
 Tue 22  
 Wed 23  
 Thu 24  
 Fri 25  
 Sat 26  
 Sun 27 NCS – K3XS  
 Mon 28  
 Tue 29  
 Wed 30  
 Thu 31

*First Class Mail*

The Phil-Mont Mobile Radio Club, Inc  
 641 Kismet Road Philadelphia PA 19115

*The Blue*